

CLAIMS

1. A particle injector (15, 15', 15") for introducing particles into a carrier flow of a microfluidic system, in particular for injecting biological cells into the carrier flow of a cell sorter, with
  - at least one inlet (34, 34', 34") for receiving the carrier flow,
  - at least one outlet (37, 37', 37") for discharging the carrier flow with the introduced particles,
  - at least one carrier flow channel (42, 42', 42"), connecting the inlet (34, 34', 34") to the outlet (37, 37', 37"),
  - at least one injection channel (43, 43', 43") terminating in the carrier flow channel (42, 42', 42") for introducing the particles into the carrier flow,**characterized in that**  
the carrier flow channel (42, 42', 42") has substantially no dead volume.
2. The particle injector (15, 15', 15") as claimed in Claim 1, characterized in that the injection channel (43, 43', 43") terminates obtusely in the carrier flow channel (42, 42', 42").
3. The particle injector (15, 15', 15") as claimed in Claim 1, characterized in that the injection channel (43, 43', 43") terminates substantially right-angled in the carrier flow channel (42, 42', 42").
4. The particle injector (15, 15', 15") as claimed in any one of the preceding claims, characterized in that the inlet (34, 34', 34") and the outlet (37, 37', 37") have a substantially same-size cross-section.
5. The particle injector (15, 15', 15") as claimed in any one of the preceding claims, characterized in that the inlet (34, 34', 34") and/or the outlet (37, 37', 37") has a

- centering aid (40, 40', 40", 41, 41', 41"), to arrange a line (36, 39) coaxially to the carrier flow channel (42, 42', 42") on the inlet (34, 34', 34") and/or on the outlet (37, 37', 37").
6. The particle injector (15, 15', 15") as claimed in Claim 5, characterized in that the centering aid (40, 40', 40", 41, 41', 41") comprises a substantially hollow-cylindrical take-up, which borders the carrier flow channel (42, 42', 42") and is arranged coaxially to the carrier flow channel (42, 42', 42"), whereby the inner diameter of the take-up is larger by the wall thickness of the line (36, 39) than the inner diameter of the carrier flow channel (42, 42', 42").
  7. The particle injector (15, 15', 15") as claimed in any one of the preceding claims, characterized in that the injection channel (43, 43', 43") is arranged on the top side.
  8. The particle injector (15, 15', 15") as claimed in any one of the preceding claims, characterized in that the injection channel (43, 43', 43") has a cross-section, which narrows down to the carrier flow channel (42, 42', 42").
  9. The particle injector (15, 15', 15") as claimed in any one of the preceding claims, characterized in that the carrier flow channel (42, 42', 42") has a cross-section, which widens away from the inlet (34, 34', 34") towards the outlet (37, 37', 37").
  10. The particle injector (15, 15', 15") as claimed in any one of the preceding claims, characterized in that the inlet (34, 34', 34") of the carrier flow channel (42, 42', 42") is located on the underside and the outlet (37, 37', 37") of the carrier flow channel (42, 42', 42") is located on the top side.
  11. The particle injector (15, 15', 15") as claimed in any one of the preceding claims, characterized in that the injection

channel (43, 43', 43") has a feeding-in aid (45) for an injection needle.

12. The particle injector (15, 15', 15") as claimed in Claim 11, characterized in that the feeding-in aid (45) has funnel-shaped cross-section widening (50) of the injection channel.
13. The particle injector (15, 15', 15") as claimed in Claim 11 or 12, characterized in that the feeding-in aid (45) comprises a detachably attached separate component, in which a funnel-shaped feed opening (50) is arranged, which terminates in the injection channel (43, 43', 43") in the mounted state.
14. The particle injector (15, 15', 15") as claimed in any one of the preceding claims, characterized in that the carrier flow channel (42, 42', 42") has a substantially shoulder-free inner contour.
15. The particle injector (15, 15', 15") as claimed in any one of the preceding claims, characterized in that the carrier flow channel (42, 42', 42") has a volume of between 0.02  $\mu$ l and 1 ml.
16. The particle injector (15, 15', 15") as claimed in any one of the preceding claims, characterized in that the particle injector (15, 15', 15") can be autoclaved.
17. The particle injector (15, 15', 15") as claimed in any one of the preceding claims, characterized in that the particle injector (15, 15', 15") at least partially comprises a polyether ether ketone, LEXAN®, ceramic or metal.
18. The particle injector (15, 15', 15") as claimed in any one of the preceding claims, characterized in that the particle injector (15, 15', 15") at least partially comprises a heat-conductive material.

19. The particle injector (15, 15', 15") as claimed in Claim 18, characterized in that the particle injector (15, 15', 15") is connected with a temperature sensor (30) and/or with a tempering element (31).
20. The particle injector (15, 15', 15") as claimed in any one of the preceding claims, characterized in that the inlet (34, 34', 34") and/or the outlet (37, 37', 37") has a thread (35, 35', 35", 38, 38', 38") for attaching a line (36, 39).
21. A microfluidic system, in particular cell sorter, with a particle injector (15, 15', 15") as claimed in any one of the preceding claims.
22. The microfluidic system as claimed in Claim 21, characterized in that the particle injector (15, 15', 15") in a carrier flow line (14) is arranged, whereby the carrier flow line (14) terminates in a cell sorter (1).
23. The microfluidic system as claimed in Claim 21 or 22, characterized by a temperature sensor (30) for measuring the temperature of the particle injector (15, 15', 15").
24. The microfluidic system as claimed in any one of Claims 21 to 23, characterized by a tempering element (31) for heating and/or cooling the particle injector (15, 15', 15").
25. The microfluidic system as claimed in Claim 23 and 23, characterized by a temperature controller (32), which is connected on the input side to the temperature sensor (30) and on the output side to the tempering element (31).
26. The microfluidic system as claimed in any one of Claims 22 to 25, characterized in that several particle injectors (15.1-15.3) are arranged successively in the carrier flow line (14').